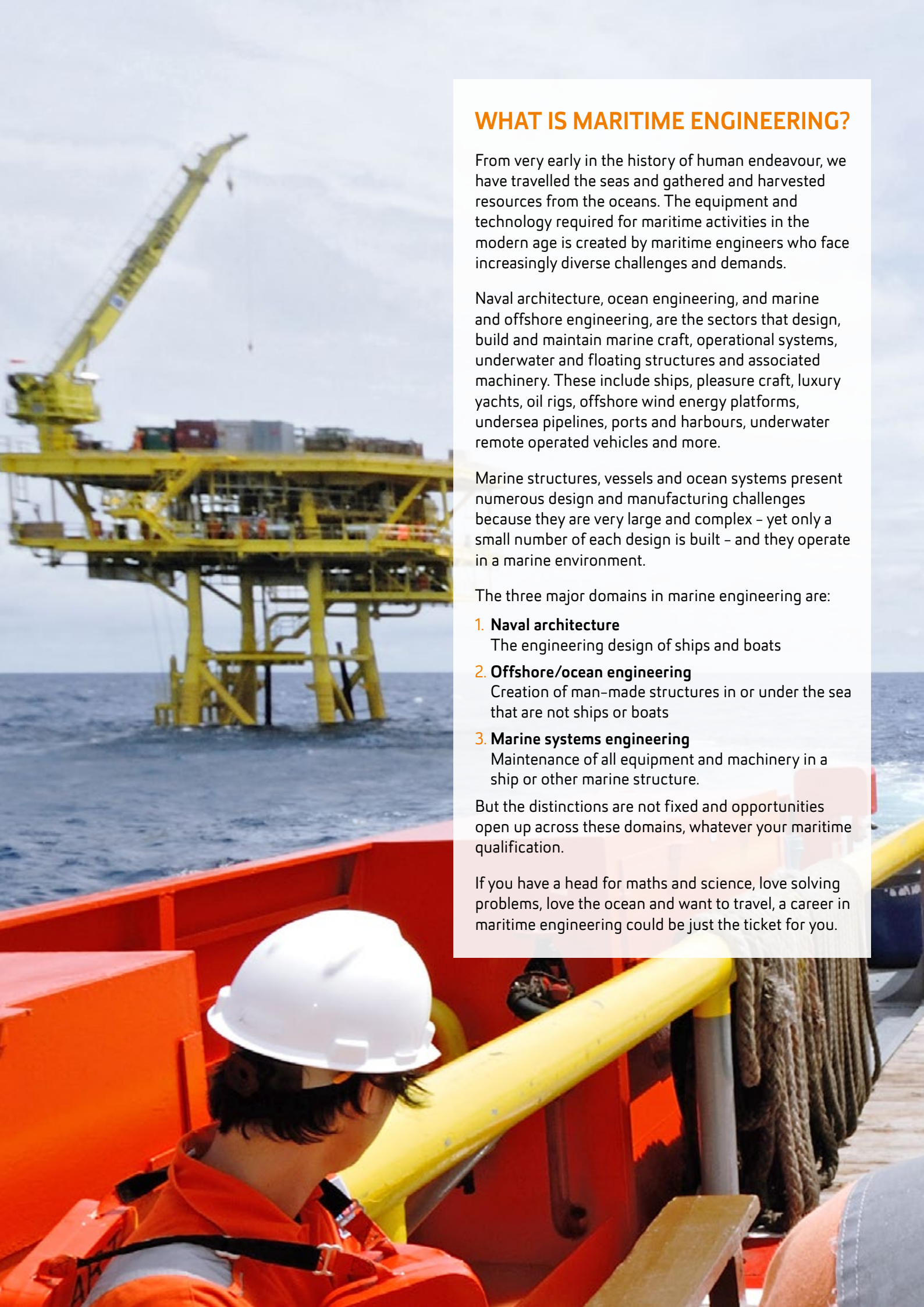
AUT

A FUTURE IN **MARITIME ENGINEERING**



WHAT IS MARITIME ENGINEERING?

From very early in the history of human endeavour, we have travelled the seas and gathered and harvested resources from the oceans. The equipment and technology required for maritime activities in the modern age is created by maritime engineers who face increasingly diverse challenges and demands.

Naval architecture, ocean engineering, and marine and offshore engineering, are the sectors that design, build and maintain marine craft, operational systems, underwater and floating structures and associated machinery. These include ships, pleasure craft, luxury yachts, oil rigs, offshore wind energy platforms, undersea pipelines, ports and harbours, underwater remote operated vehicles and more.

Marine structures, vessels and ocean systems present numerous design and manufacturing challenges because they are very large and complex – yet only a small number of each design is built – and they operate in a marine environment.

The three major domains in marine engineering are:

1. **Naval architecture**
   The engineering design of ships and boats
2. **Offshore/ocean engineering**
   Creation of man-made structures in or under the sea that are not ships or boats
3. **Marine systems engineering**
   Maintenance of all equipment and machinery in a ship or other marine structure.

But the distinctions are not fixed and opportunities open up across these domains, whatever your maritime qualification.

If you have a head for maths and science, love solving problems, love the ocean and want to travel, a career in maritime engineering could be just the ticket for you.

OUTLOOK AND TRENDS

Maritime engineering is fast growing and dynamic, with employment opportunities that continue to increase as people turn to the oceans for resources such as food, transportation and energy. Government, industry and academia are hungry for experts and researchers to develop new processes and systems to explore and travel the ocean, achieving economic and social goals, while minimising impact on the environment.

Offshore development
Offshore exploration is a growth field involving drilling for oil and gas, and iron ore harvesting. In the petroleum industry there is increased exploration and deep water development in and around coastal New Zealand.

In Europe and the US there is strong demand for engineers of offshore renewable energy structures – e.g. wind energy platforms and wave energy devices.

Global shifts
The key areas of growth and activity are shifting. Within the last decade, China has massively invested capability in all areas of maritime engineering. Production lines are delivering large numbers of quality, fast ships. European production is now mostly centred on more specialised ships.

New areas of offshore oil and gas exploration such as Brazil and the Arctic present challenges in the form of ultra-deep water and severe physical conditions.

Ship design and construction
Globally, demand is good. The super-yacht industry slowed a bit in New Zealand in the past few years but there are signs of a recovery with several recent contracts awarded to Kiwi firms/operations. Commercial ship construction is limited but each year a number of workboats, local ferries, tugboats, barges and patrol type vessels are built.

Greener ships
International marine environmental conventions, such as MARPOL 73/78, are driving the move to a greener global shipping fleet. A vast amount of research continues to be needed in areas such as the reduction of pollution (dumping and emissions) and fuel consumption.

WORK SETTINGS

Work environments are diverse and widely spread around the world. Some roles may primarily be office-based, computer-facing situations. Many involve travel and spending substantial time onsite, eg in shipyards, factories, oil rigs, ports and on board the ships and structures themselves.

Employers include ship building businesses, shipping and transport companies, energy companies, government agencies, research organisations, universities, the Royal NZ Navy and other navies.

Marine consultancy companies also offer employment opportunities with commercial vessel owners to supplement their own operational engineering teams.

CAREER EXAMPLES

Naval Architect
Designs ships and boats, related components and specialist equipment. Plans the whole build process of a vessel, managing everything from concept through to delivery of the final product. Acts as a consultant – providing clients with engineering solutions, technical and commercial guidance and project management. Carries out risk analysis of ships and marine structures.

Ocean Engineer
Develops, designs, and analyses systems that operate in marine environments and/or harness the ocean's resources. Prepares system layouts, detailed drawings, and schematics. Inspects marine equipment and machinery. Designs, conducts, and oversees tests on marine machinery and equipment. Determines the effects of waves, currents, and the saltwater environment on marine vehicles, structures, instruments, and equipment.

Marine Engineer Officer – Royal New Zealand Navy (RNZN)
The Navy's experts on ship structure, propulsion, power generation, hydraulic and habitability systems. Leads the Marine Engineering Department, manages projects, equipment procurement and upgrades, system performance analysis and maintenance planning. Makes decisions in the ship's response to fire-fighting and damage control. Performs duties in support of the fleet at a naval base.

Subsea Engineer – offshore drilling company
Operates and maintains all subsea-related equipment. Supervises the installation and monitoring of BOP (blowout preventer) operations. Carries out regular BOP tests and drilling. Provides expertise on technology, cost estimation and risk, installation and support services. Communicates with colleagues and clients.

SKILLS AND KNOWLEDGE

- Ability to problem-solve, diagnose mechanical faults and create practical solutions
- Skills in analysis of hydrodynamics, stability, mooring and longitudinal strength
- Good communicator, able to lead others, collaborate in a team and communicate effectively in a multi-disciplinary environment
- Confident in adapting and applying engineering principles to new or different situations, projects and tasks
- Skilled in developing products using computer modelling and design software
- Knowledge of structural engineering, boat and marine structure building methods, performance of materials, marine standards and safety regulations.

PERSONAL QUALITIES

- Creative and visionary, able to see the potential to use marine environments effectively and sustainably
- Highly organised, logical thinker, accurate with an eye for detail
- Responsible, adaptable, practical, and methodical
- Confident decision-maker who can remain calm in emergencies
- Thrives in a challenging work environment.

SALARY GUIDE

Maritime engineering is a highly globalised industry; overseas salaries may vary considerably from the figures given below.

	Usual salary (per year)
Marine engineers (starting)	$60,000 - $80,000
Marine engineers (5 years' experience or more)	$80,000 - $165,000
Naval architects	$40,000 - $150,000
Boat designers	$35,000 - $70,000

Sources: Careers NZ

Salary range is indicative of the New Zealand job market at the time of publication and should only be used as a guideline.

PROFESSIONAL REGISTRATION

Professional registration is not always required, however membership of appropriate professional bodies such as IPENZ, IMarEST or the Royal Institution of Naval Architects is advantageous for career development and keeping up to date with current trends and technologies.

THE AUT ADVANTAGE

AUT's Bachelor of Engineering (with maritime majors), the first degree of its type available through a New Zealand university, is offered in partnership with the Australian Maritime College (AMC) in Tasmania. The first two years are completed at AUT in Auckland, the final two years at AMC.

FURTHER STUDY OPTIONS

At AUT, further study in maritime engineering is available at postgraduate level, including the Master of Philosophy and Doctor of Philosophy.

At AMC, postgraduate options include: Master of Applied Science (with maritime specialisations); Master of Engineering (with maritime specialisations); MBA (Maritime and Logistics Management).

JASON WILLIAMS

Subsea 7, Perth, Australia

Bachelor of Engineering in Naval Architecture (Honours)*

"Throughout high school I was leaning towards engineering however, I didn't want to just design buildings and bridges. I decided to combine my love of water activities and engineering and chose to study naval architecture. As I progressed through my studies, I realised that naval architects can apply their engineering knowledge to not just vessels, but all floating marine structures and subsea infrastructure. I decided that this was the area I wanted to work in.

I am now a project and installation engineer with Subsea 7. Every day provides diverse challenges and opportunities. On any one day I might be in the office writing installation procedures and the next out on a vessel managing the method in which my procedures are being executed for the installation of subsea structures, pipelines, and the like.

The opportunity to travel around the world is immense, having already been to Aberdeen, Edinburgh, Paris, Rotterdam, London, Stavanger and Moss in my first 12 months. This has been great as I have been able to learn how different cultures operate, while developing worldwide friendships."

* Note: Jason completed his qualification fully through Australian Marine College (AMC). The first AUT/AMC joint graduates are expected to complete end of 2016.

INDUSTRY COMMENT

"In this industry we look for people with a dynamic and intuitive way of thinking. Graduates need to be adaptable, able to find the required information, interpret, understand and apply it. This may require moving outside of the confines of what you learnt at university.

You also need sound understanding of project execution, planning and organisation, and the ability to write up procedures and analytical reports to a professional standard of presentation.

There will always be ups and downs in the type and availability of projects but remember the world will always need some source of energy. Take a look at offshore wind farm installation for example, as this is one way oil and gas installation contractors are creating new work."

Subsea7, Australia
(global contractors in seabed-to-surface engineering, construction and services to the offshore industry)

USEFUL WEBSITES

Maritime New Zealand
www.maritimenz.govt.nz

International Maritime Organisation
www.imo.org

SNAME (Society of Naval Architects and Marine Engineers)
www.sname.org/educationoptions/careersinthemaritimeindustry

RINA (The Royal Institution of Naval Architects) is international but has a NZ branch.
www.rina.org.uk

NIWA (National Institute of Water and Atmospheric Research)
www.niwa.co.nz

For the most up-to-date maritime engineering information, visit our website:
www.aut.ac.nz/maritime

You can also contact the AUT Student Centre team for help and advice:

0800 AUT UNI (0800 288 864)
email: studentcentre@aut.ac.nz

CITY CAMPUS
55 Wellesley Street East, Auckland Central

NORTH SHORE CAMPUS
90 Akoranga Drive, Northcote, Auckland

SOUTH CAMPUS
640 Great South Road, Manukau, Auckland

AUT MILLENNIUM
17 Antares Place, Mairangi Bay, Auckland

Connect with us now:
www.aut.ac.nz/social

The information contained in this career sheet was correct at time of print, March 2015